

SCIENCE

NEW YORK, DECEMBER 25, 1891.

THE RELATIONS OF GEOLOGICAL SURVEYS TO SUCCESSFUL MINING.¹

THE subject assigned to me for presentation to-night is, The Relations of Geological Surveys to Successful Mining. Other papers have been read to you and addresses have been made descriptive and eulogistic of the mineral resources of Missouri. It remains for me to present to you how such an organization as I have the honor to direct aids in their development. It gives me pleasure, gentlemen, to appear before you to discuss so fertile a theme as this. I would that I had time to attempt to do it full justice. I feel also gratified in being asked to do so before such a body of mining and business men, because we geologists are often led to believe that, among you busy men of affairs, there is sometimes a feeling that a scientist is a poor sort of creature anyhow, who spends his time hunting fossils or learnedly ventilating elaborate theories which nobody knows how to make use of. This we feel, of course, is all wrong, and especially that you are all wrong, and hence such opportunities as this, where we can stand up and make it quite clear to you how you are all wrong, without your having a chance to reply, are always to be coveted.

But before we can proceed to do this let us understand what we are going to talk about. First, then, what is meant by the term "mining" in this connection? Mining, strictly speaking, is a process of excavating certain materials from the ground. With such actual mining of ore I must confess that our work has only indirect connection. This must be left to the judgment, energy, and perseverance of the miner, and the success of any mining venture is always largely dependent upon his genius in overcoming the difficulties encountered. But over and above this, the magnitude and importance of a mining industry is dependent first upon the nature of the materials mined, and second upon the extent to which these materials are used. I take it, therefore, that the sense in which it is meant that mining shall be considered upon this occasion is the broad one embracing all that is concerned, not only with the production of minerals, but also with their complete utilization; or, briefly, I will define it as the exploitation and the utilization of the mineral possessions of an area. The question now stands, therefore, what are the relations of a geological survey to these ends? To properly answer this it first becomes necessary to consider what are the fundamental requirements for the successful exploitation and utilization of the materials considered.

Manifestly the first thing necessary for the inception of mining is the discovery of the existence of the materials worthy of mining. It seems so perfectly clear that there can be no mining of a material without the presence of that material, that I would not say even these few words on so self-evident a statement, did not such facts as Missouri's tin mines and Arkansas's gold mines seem to stare me in the face in refutation of my proposition. Still, I will not yield my point, but merely elucidate it by adding that attempts at mining can always be made, as many of you doubtless know to your sorrow, without any foundation whatsoever.

Second, and next in importance to the discovery of existence for the development and sustenance of a mining industry, is the determination of the quantity and distribution of the material to be mined. A substance may exist, but it may be in such a small quantity as to be unworthy of consideration, as are, I fear, the tin ores of the United States. Or it may exist in large quantity, but be

¹ An address delivered by Arthur Winslow, State Geologist of Missouri, before the Inter-State Mining Convention, held in Springfield, Mo., Dec. 15-17, 1891.

so disseminated or diffused as to be unattainable with profit, as is the gold which occurs in places, in the sands of northern Missouri. Finally, it may be both in large quantity and concentrated, but inaccessible, either by reason of its existence at excessive depths, as are some coal beds, or by reason of topographic isolation or geographic remoteness with absence of means of transportation, as are some of the iron and other ores of this State.

Third, in addition to the facts of existence and distribution, that mining may attain its fullest vigor and soundest prosperity it is necessary that the qualities and capabilities of the materials be exhaustively determined. This is important in both a negative and a positive way, according to whether the results prevent useless undertakings or direct enterprise in the right direction. An ore may be abundant and its distribution well known, yet it may be so lean, or so injured by impurities, as to be of low value, or even entirely worthless. A building-stone may be of handsome appearance and may be obtainable from the quarry in large blocks, yet when exposed to the condition of atmosphere and temperature of a large city, it may deteriorate rapidly. A superior clay may be used for ordinary purposes for which an inferior product would answer just as well, and a determination of its qualities may lead to its increased use for many other purposes, with enhanced value.

Different coals are put to different special uses. The determination of the essential properties of any one coal will lead to its ultimate use for all the purposes it is best adapted to. An uncommon but valuable material may lie neglected in great quantities, simply because its capabilities are not appreciated. This was the case for many years with the anthracite coal of Pennsylvania, which was practically ignored simply because people did not know how to burn it; a material which is now mined at a rate of nearly fifty million tons per year.

Fourth, and finally, as a necessary supplement to the determination of the existence, distribution, and properties of materials, is the dissemination of the knowledge in a way which will reach those who should know, and in a manner which will command their attention. If the knowledge of the existence of useful materials is confined to an individual or to a small circle, their development will be slow. The information must reach the right ears for the full effect to obtain; and not only that, it must reach those ears in the right way or it is not credibly received. The world is too full of vague rumors, of bubbles and booms, for startling or even all rational seeming statements to gain ready credence. People are more inclined to be incredulous of such good news than credulous, unless it is backed by well-known authority.

Thus reviewing what I have said so far, four fundamental requirements for the development and sustenance of a substantial mining industry are:

1. The discovery of the existence of the materials.
2. The discovery or determination of their quantities and distributions.
3. The discovery or determination of their qualities and capabilities.
4. The proper dissemination of the knowledge of these facts.

These being granted as fundamentally necessary for the development of mining, it follows that any work having for its object the accomplishment of these ends is, in intention at least, a contributor to the success of such industry. That conclusion follows logically and is necessary; the degree to which it is a contributor depends upon the extent to which it attains its objects. The relations of a geological survey to successful mining will hence be well displayed by a consideration of the manner in which it contributes to the four ends specified.

First, then, with relation to the discovery of the existence of

materials, how and to what extent does a geological survey accomplish this? Well, to answer this question satisfactorily we must first determine what is meant by the term "discovery." The date when the existence of any one material first became a fact in the consciousness of man can never be stated. It is probable that the gold in California was known to exist by the aborigines, merely as glittering particles or nuggets of undetermined properties, long before the "white man" made the fact of its existence known, or, as we say, discovered it. It is probable that many a block of silver ore was seen and handled unrecognized by the pioneer long before mining first began. Again, it is probable that the primeval savage of California both knew of the existence of the gold and was familiar with its general properties and value, yet from the isolation and barbarism of his surroundings the fact of existence was never made through him the property of the civilized world. Hence, so far as its effect on civilization is concerned, we must define discovery of existence as that event whereby a material is brought to the knowledge of an individual who recognizes it and who has a conception of its value, and who transmits the fact of existence to the world. Such a work of discovery constituted a large part of the functions of the early explorations throughout the country of the earlier geological surveys. The more general facts of existence were then sought after, knowledge was so imperfect. This was the necessary foundation for further investigation for future development. Nowadays the work of geological surveys is tending more to the solution of other questions.

With reference to Missouri as a whole, it may safely be said that we do not look for the discovery in the future of the existence in considerable quantity of a single mineral substance of great economic value, the existence of which is not already known. But though, in this large sense, such is, strictly speaking, true, in a narrower sense, and in the sense that the existence of materials in special localities is being brought to the knowledge of men who will recognize them and make the facts known to the world, discovery is still in progress in the State and constitutes an important part of the work of the geological survey. Discoveries of this kind of iron-ores, zinc and lead-ores, clays and coals, and other materials have been made throughout the State during the past year, and the results will be published in the forthcoming reports. Such discoveries are made by all well-conducted geological surveys, and they are thus extensive contributors to the first requirement for the development of a mining industry.

The discovery or determination of the quantities and distribution of materials is, however, nowadays recognized as one of the principal directly economic functions of a geological survey, and it is the work requiring the highest attainments and the most studious and exhaustive investigation. The science of geology is here called into play, and the knowledge accumulated during many years by multitudes of observers is applied for the solution of the problems. The mere existence of a material may be determined by any one with a small stock of knowledge and a rambling search. The quantity and distribution can generally be deduced only from a host of facts gathered with close and patient observation, and then studiously and logically handled. It is first an inductive and then a deductive process. The general laws and facts of geology have to be known before a correct diagnosis can be made. Therefore, just as a physician can best treat a patient if he knows his structure, constitution, and habits well, so a geologist can best accomplish his results if he knows thoroughly the geological structure of the area he is examining, and the laws governing its phenomena. Hence it has come to be recognized in theory, and is accepted in the best practice, that the most valuable and far-reaching results are attained when the fundamental facts of the geology of an area are mastered. A due regard for logic demands that the general principles shall be established before we attempt the solution of particular cases. To illustrate, most of the rocks exposed in Missouri and adjacent States are what are called clastic or sedimentary rocks, and occur in strata, or layers, piled upon each other like the leaves of a book. Each layer is, however, not co-extensive with the area of the State, but generally the uppermost occupies the smallest area, and those underlying it protrude beyond it successively in constantly expanding

zones, so that their limits are defined on the map by a series of roughly concentric lines, or, as has been said by Lesley, like the grain lines of a polished piece of wood, planed at a low angle across the grain.

Some minerals of value frequently characterize certain strata or formations; this is especially the case with coal, iron, and clays, and sometimes with lead and other ores. Hence, if the distribution of these strata is once defined, through the study of the geology, the value of the knowledge as a guide to prospecting for all future will be readily appreciated. This definition of the areas of the strata or geological formations is hence recognized as an important duty of a geological survey. Here it is that fossils are of use. Some fossils are restricted to certain strata, or, more exactly speaking, different strata have different faunal characteristics; hence, fossils become ear marks which help us to recognize outcrops as belonging to certain formations and lead us to a correct classification of the scattered occurrences. For example, suppose that over a coal bed worked at a point, A, is a bed of limestone characterized by certain fossils. At a point, B, is another coal mine, and the question arises as to whether the bed at B is the same as that at A. Or, in other words, have we at B one or two coal beds, a question of much economic importance. A close examination in the creek bed below the outcrop of coal at B reveals the existence of a limestone bed with the same fossils as those found over the coal bed at A. Hence, the inference is direct that that the coal of A underlies the coal of B, and will be found on investigation.

In working out the distribution of the geological formations on the ground this end is the immediate and controlling one to the field geologist, and its economic value is not always in his mind; and to a still smaller degree is the fact ordinarily appreciated by the layman; hence the former's operations are frequently regarded, by those of ultra utilitarian minds, as mildly idiotic. In illustration, an assistant of mine on the Arkansas survey, a capable and well-trained man, was at one time engaged in tracing the outcrops or limits of a certain stratum of sandstone in the coal measures of that State. He stopped one night at a farmer's house for lodging. After the evening meal, the host and his guest having settled themselves in front of the blazing log heap of a fire, which all Arkansas travellers enjoy, the farmer, learning the vocation of his guest, thought he would seize the opportunity to obtain some useful information. "Well, my friend," he began, "have you discovered any mineral about here?" "No," answered the young man, who was somewhat shy and non-communicative. "Not found any!" echoed the farmer; "well, now, that's too bad. Don't you think you will find some soon?" he questioned. "No," again answered the young man, who was strong in monosyllables. "Haven't found any and don't expect to find any,!" ejaculated the somewhat astonished questioner; "well, what do you stay here for, then?" "I am not looking for mineral," was the young man's brief reply. "Not looking for mineral!" exclaimed the dumbfounded and now somewhat irate farmer; "then what in the name of creation is your work good for?" Here, then, were two men at loggerheads simply for lack of a little explanation. The young man was tracing a stratum, which, when transferred to the map, would define the area of an important coal bed. Absorbed in the immediate object of his work, he lost sight of a part of its outcome; he was in one sense engaged in the actual "discovery of mineral" without being entirely conscious of it. A few words of explanation might have made all clear.

These illustrations will suffice to explain how the determination of the general facts of stratigraphic structure are of broad economic value. The definitions of the members of the oil-sand group, in Pennsylvania, of the Trenton limestone in Ohio, permitted the intelligent and rapid development of the oil industry.

Similarly the determination of the sources of our ore bodies, of their modes of formation is of fundamental importance, is indispensable for the construction of the correct theory of their distribution, which alone will lead to their full development, and which will prevent waste through expenditure in the wrong direction. I could illustrate this in detail, but time will not permit, and I think the principle is already made clear. Such are some of the

discoveries of geologic science; these are the results which we strive to express in our maps and reports, over and above the details of occurrence. The latter serve as a means for attaining the former and are necessary for that purpose. They are gathered sedulously in the field and are studied in the office. Thus, in the office, are most of the discoveries of modern science made. The facts of observation are our mediums, the laws of reasoning are our divining rods and witch-hazels. The determination of the qualities and capabilities of materials we have recognized as an important pre-requisite to the full development of a mining industry. Such work is also properly made the function of a geological survey. Some materials show on their faces, from mere inspection, what their value is; such being the case with most of the zinc and lead ores of this region. Others need more or less elaborate tests for the fact to be determined. Iron-ores may appear and be rich in iron contents, yet they need to be analyzed to determine the amounts of sulphur, phosphorus and silica, which they contain before their capabilities can be predicted. Mineral waters need similarly to be analyzed before their beneficial qualities can be known. Coals and clays need similar treatment, and in addition they should be subjected to exhaustive tests, on a working scale. An analysis of a building stone yields little knowledge as to its capabilities, and here the thorough experimental test is alone capable of demonstrating just what the value of the stone is. The analysis and tests above enumerated are either actually or prospectively part of the work of the Geological Survey, and most valuable results have been reached, especially with the clays of the State, which will be incorporated in future publications. That the additional information thus acquired concerning the mineral deposits of the State will contribute to their further development seems indisputable.

Finally, in what way does a geological survey disseminate knowledge concerning these materials and is this way an effective one? A geological survey, if properly organized, is composed of professional men of scientific attainments and of undoubted integrity; it is an official organization, and its examinations are made disinterestedly, and on the truthfulness of its results depends the reputation of its members. Its publications are widely circulated; they are designed to be used by the professional man and also by the layman; being official, and coming from such a disinterested and qualified source, the results are accepted generally without hesitation by the capitalists or manufacturers. Such influence and acceptance could never be reached by reports emanating from owners of property or other interested parties, nor would the judgment of such concerning theories of distribution or quality command respect, unless emanating from well known expert sources; thus the capital and enterprise necessary for the inception of such undertakings would be slow to follow such guidance. Hence, a good geological survey constitutes the best of advertising mediums, if you choose to call it such; advertising what is genuine and good, but never stooping to indiscriminate boomeranging.

But another means of disseminating information exists, over and above that of publications. Some people are not reached by reports, either because they are not given much to reading, or for lack of access to the publications. They may come to the State, or even be in the State, knowing little or nothing of its natural features and products. In such cases, a State museum is the most effective means of conveying information; a museum which shall contain not only specimens of materials, but maps, models, views, diagrams, and reports concerning all that is of interest in this connection; the materials in which shall be so arranged as to convey clear ideas, not only of what is in the State, but where it is, how it occurs, and how much there is of it; which shall be supplemented by the presence of trained men, familiar with the State, who can guide the stranger in the right direction.

In conclusion, I would say a few words concerning the educating influences of a geological survey among the citizens of the area in which it operates. Through its publications, through the intercourse with its members, and in other ways, a vast amount of information is absorbed by the people concerning the land they live in and its products. This information they apply unconsciously in their various operations. It prevents them from being

led into hopeless enterprises, it leads them to discountenance extravagant expectations and to recognize charlatanry, it brings them to appreciate the truly useful and valuable, and it supplies them with a source of advice which many are otherwise destitute of.

Finally, if their serious attention is aroused, they are soon brought to see in all nature that surrounds them, a wonderful relationship of parts, to read the history of a wonderful succession of events; they begin to hear the "sermons of the stones," which ever after become replete with interest and significance, exercising refining influences and acting as healthy stimulants to intellectual effort.

NOTES AND NEWS.

THE Geological Society of America will hold its winter meeting in Columbus, Dec. 29-31.

— From a report on mine ropes to the French Government, it appears that hemp or aloes ropes are almost exclusively used for all depths of shaft in Belgium. The makers guarantee the ropes to last one and a half to two and a half years, and should they fail earlier, a twelfth to a twenty-fourth of their cost is deducted for every month short of their stipulated duration. Steel-wire ropes, according to *Invention*, should be of crucible steel having a breaking strength of 70 to 76 tons per square inch. Large pulleys are more necessary for wire than for hemp ropes, the smallest diameter permissible being 1,300 to 1,400 times the diameter of the wire in the rope, if of iron, and 2,000 times if of steel. For mining purposes wire ropes are best made with a hemp core being more flexible.

— Poisoning by mussels is a well-known fact. Such poisoning appears in chronic form in Tierra del Fuego, mussels being abundant on the shores, and other kinds of food rare, so that the natives eat large quantities of the former daily, both of bad and of good quality. According to a doctor of the Argentine fleet, M. Segers, as *Nature* reports, the mussels are rarely injurious at their maximum time of growth, which corresponds with full moon, but when the moon wanes, they become poor and often poisonous. The poisonous quality apparently results from the death of a large number at this time, and the putrefaction of their bodies yielding ptomaines which are absorbed by the surviving mollusks. In any case, the Fuegians are often attacked by a liver complaint, consisting in atrophy of the organ, with jaundiced color of the skin and tendency to hæmorrhage; and M. Segers believes this is due to mussel poisoning. He finds sulphate of atropine an efficacious antidote.

— According to the *Lancet* a noteworthy difference between the present outbreak of influenza and those experienced last spring and the original epidemic of the winter of 1889-90 is the comparative slowness of its diffusion over the country. It was, in November, mainly confined to two widely separated parts of the kingdom, Cornwall and the eastern counties of Scotland. It is remarkable that children are attacked almost as much as adults. It is reported to be very prevalent in St. Petersburg and Berlin, while at Hamburg it reached "alarming proportions," and the weekly mortality of the city and its suburbs exceeded the average by 280. In France it is especially prevalent at Bordeaux, where many deaths among the aged have occurred. It has also appeared in Paris. In showing some patients to his students a few weeks ago, Professor Gerhardt of Berlin said, "The morbid symptoms which we comprehend under the collective name of influenza have repeatedly been observed before, and several epidemics of the so-called 'grippe' (those of 1847 and 1876, for instance) are on record. Such a pandemic, however, as prevailed two years ago had not occurred for a generation, and we had to deal with something quite new and unknown. It came to us from the East. In May, 1889, it broke out in Bokhara, rapidly overran Russia in Asia, and came to St. Petersburg in September. The disease spread rapidly all over Europe, radiating over the provinces from Berlin, Vienna, Paris, and London, and remaining mostly three or four weeks, never more than two or three months, in one place. Its course ran unmistakably from east to west; from us it went to America

and then on to Eastern Asia. Now it seems to have arrived among us again after its journey round the world. The symptoms are remarkably various. The malady often takes an easy course, and is in general not very dangerous to robust people. It begins in most cases with high fever, which rapidly abates. In the graphic representation of the progress of the fever the steep and narrow one-day's curve seems to be characteristic. A vast number of sequelæ have been observed. Already existing diseases, such as pulmonary tuberculosis and diseases of the heart, often take an unusually rapid and fatal course under the influence of influenza. Influenza must be reckoned among the acute infectious diseases, and its contagious character may be regarded as proved. The spread of the disease is uncommonly rapid, and the time of incubation is often less than twenty-four hours, never more than two or three days. The question whether one attack protects the patient against future ones cannot be definitely answered; some immunity there must be, for the epidemic never lasts very long. Children are seldom attacked, sucklings never. Some people are temporarily insusceptible. Doctors, for instance, have often fallen ill at the end of the epidemic. The age from fifteen to twenty-five seems to be the most susceptible. No specific against the disease is known; the doctor must therefore confine himself to symptomatic treatment."

— Principal J. L. Thompson, of the Hawkesbury Agricultural College, New South Wales, has no doubt, according to *Nature*, that the climate and much of the soil of Australia are well suited for the culture of the olive. All that is needed, he thinks, is an adequate supply of labor. He himself has been very successful in preserving green olives; and in a paper on the subject in the August number of the *Agricultural Gazette* of New South Wales he gives the following account of the system adopted: The olives are very carefully picked from the trees when about full-grown, but perfectly green. They should be handled like eggs. If they are bruised in any way, they will become black and decompose. In the green state, olives contain gallic acid, which gives them an acrid taste. To remove this they are, first of all, steeped in alkaline water, made either of wood ashes, lime water, or washing soda; of the latter, about three or four ounces to the gallon of water. As soon as the lye has penetrated through the pulp, which is usually in from eight to ten hours, they are put into clean water, and steeped until all acrid and alkaline taste has been removed. During that time the water is changed every day. They are then put into brine, composed of one pound of salt to each gallon of water, and kept carefully covered with a thick linen cloth, for if exposed to the air they will turn black. They are finally put up in air-tight jars.

— Lépine and Barral (*Comptes Rendus*, cxii., Nos. 5 and 8) collected some arterial blood from a dog in a vessel cooled to 0° C., then defibrinated it, and at once estimated the amount of sugar it contained. Other samples of the same blood were kept at different temperatures; *b* at 39°, *c* at 49°, *d* at 52°, and *e* at 55° C., and left for one hour. After this time the amount of sugar in *b* was found to be $\frac{1}{4}$, in *c* and *d* $\frac{3}{10}$ to $\frac{2}{5}$ less than in *a*, while in *e* it was the same as in *a*. This shows that the "sugar-destroying ferment" acts better the higher the temperature, until at about 54° C. its activity is destroyed. If blood withdrawn from an artery be centrifugalized, one obtains a serum which of course contains more sugar than the original blood, because the corpuscles contain scarcely any sugar. If such serum be kept at 39° C. for some time—for example, one hour—there is no diminution in the amount of the sugar, while blood similarly treated loses one-quarter of its sugar. If the corpuscles which are separated by the centrifugalizing process be washed with saline solution, a filtrate is obtained which, if mixed with grape sugar, causes a part of the latter to disappear when the mixture is kept at 39° C. It would seem, therefore, that the "sugar-destroying ferment" is present in the blood corpuscles.

— The old tower in Saragossa is doomed. It was erected four centuries ago, but it is still, as on its first day, the Torre Nueva. As an example of Spanish brickwork the tower is interesting enough, but to its inhabitants its importance consists in its rivalry to the Pisan structure. The Torre Nueva cannot, however, be

treated as a builder's freak. If there is a departure of nine feet from a perpendicular line it is owing to the sinking of the foundations. Cases of settlement are generally chronic, and there can be no doubt of the symptoms which are to be observed in the tower. It menaces the people who are so proud of its renown. Although it was restored thirty years since, the ground could not be made firm, and owing to the subsidences, the tower was never in a worse state than it is now. The commissioners who have charge of the ancient buildings in Aragon have met and considered the reports of the architects, which state that it is no longer feasible to make the tower secure, and that the safety of the public makes demolition inevitable. But the commissioners, says *The Architect*, have affection for the tower, and, instead of approving of the operation, they have implored the advice of the Academy of St. Ferdinand, in Madrid. But a Spanish savant needs a long period of time for deliberation, and unless an accident should occur, the tower may be visible for many months or years. The faith of the custodians in its stability continues unchanged, for they allow people to ascend to the upper platform.

— According to official statistics published in the *British Medical Journal* the total number of medical men in Austria at the end of 1889 was 7,146, of whom 5,358 were doctors of medicine and 1,788 practitioners of a lower grade (*Wundärzte*, surgeons). The proportion of doctors to population was highest in the district of Trieste, where it was 61.7 per 100,000, Lower Austria being second with a very slightly lower ratio, and the Tyrol and Vorarlberg coming next at no great distance. In the other provinces the proportion was much smaller, being about thirty per 100,000 in Salzburg and Steiermark, and falling as low as 5.9 in Krain, 3.7 in Bukowina, and 3.2 in Galicia. As might be expected, the doctors of medicine most do congregate in the large towns, while the lower-grade practitioners most affect the villages and rural districts. About twenty-one per cent of the doctors of medicine practise in Vienna.

— The "Dea Febris" was invoked in the City of the Seven Hills to avert the local fever, and, in later times, a special saint is worshipped by the devout to save them from death by apoplexy. Statistics might be adduced, says *Lancet*, to show that apoplectic seizure—or, at any rate, cerebral hemorrhage—is exceptionally frequent as a "mode of dying" in Rome, the heavy atmosphere, charged (in the Campagna particularly) with malaria, and the remarkable stillness of the air, due to absence of winds, being eminently favorable to "determination of blood to the head." The saint whose intercession is implored by subjects of an "apoplectic habit," hereditary or acquired, is, curiously enough, St. Andrew. Now, as that apostle was, according to ecclesiastical tradition, crucified head downward, at his own request (as he deemed himself unworthy to win the martyr's crown in the position in which his Divine Master died on the cross), we can readily understand how he should have been selected by the faithful as the typical example of death by congestion or stasis of the cerebral circulation, and how in the saintly calendar he should be especially invoked to protect his votaries from dying by a similar cause.

— A meeting of Ohio scientists, for the purpose of organizing a State Academy of Science, will be held at Columbus, Dec. 31. The question of an Ohio Academy of Science is not a new one; it has been often broached, but, until now, no decisive step taken. In several other States such societies have been in successful operation for many years. At the annual or semi-annual gatherings of these organizations the scientists of a whole State read and discuss papers embodying the results of work in their respective fields or on methods of research or of instruction, thereby greatly aiding and strengthening one another, as well as materially advancing the cause of science and sound knowledge; moreover, experience proves that no better means has been devised for friendly and social reunion of those engaged in kindred activities. All those of the opinion that the organization of an academy of the kind proposed can be effected and maintained by the scientists of Ohio, and in a manner that will make it profitable to its members and an honor to the State, are invited to participate in its organization at a meeting called at Columbus, Dec. 31, at 2 P.M., in the High School Building. The committee issuing the call was

appointed for the purpose by the Biological Club of the Ohio State University and Agricultural Experiment Station, and has secured the promise of hearty co-operation from a goodly number who are expected to be present, read papers, and otherwise aid at this first meeting. A partial list of papers to be read is as follows: Biological Investigation of Waters, by A. M. Bleile; Notes on Lichens, by E. E. Bogue; Dollen's Method for the Determination of Time, by R. D. Bohannon; Photography in Scientific Work, by J. N. Bradford; Some Notes on the Fauna of the Wabash and White Water Valleys, by A. W. Butler; Biological Training as Preliminary to the Study of Medicine, by H. E. Chapin; Observations on *Empusa aphidis*, by Freda Detmers; Protective Inoculation, by H. J. Detmers; The Babcock Milk Tester, by F. G. Fallensbach; Mycological Notes for 1891, by W. A. Kellerman; Seed Germination at Intervals after Treatment with Fungicides, by W. A. Kellerman; Notes on the *Ægeridæ* of Columbus, by D. S. Kellicott; The Effect of Moisture upon the Vitality of Seed, by William R. Lazenby; Notes on Cross-Fertilization, by William R. Lazenby; Comparison of Evaporative Powers of Certain Coals with their Ultimate Composition, by N. W. Lord; A Study of Plant Introduction in Franklin County, by A. D. Selby; The Coal Supply of the World, by H. P. Smith; Science for the Blind, by Henry Snyder; Some Laboratory Fixtures, by Henry Snyder; Some Features of Ohio's Mollusca, by H. A. Surface; Magnetic Fields in Laboratories, by B. F. Thomas; On the Behavior of Antiseptics toward Salivary Digestion, by H. A. Weber; The Relation between the Increase of some Insects and the Overflow of Rivers, by F. M. Webster; Notes on the Fecundity of some Species of Aphides, by F. M. Webster; Variations and Intermediate Forms of certain Asters, by W. C. Werner; Post-Glacial History of Black River, by A. A. Wright.

— Dr. M. A. Veeder, Lyons, N.Y., has issued a circular, urging observations of auroras, and a blank for entering the records, which may be obtained from him. Dr. Veeder says: "In order to determine the local distribution and altitude of the aurora, it is desirable to have numerous observers suitably distributed throughout the area covered by the observations so as to secure as full information as possible as to the extent to which an aurora was present or absent during each hour. In case that an aurora is not reported from any given locality, it is necessary to have the means of determining whether this failure was due to lack of observation, or to cloudiness, etc., or whether the aurora was really absent. For this reason it is desirable that there be as few blanks as possible in the table, although even the most fragmentary record may become of importance for purposes of comparison with others. The results already obtained warrant the belief that by concerted effort information of practical value may be secured. During the coming year auroras will probably increase in frequency, especially near the equinoxes, and a single display having well defined characteristics, like that from Sept. 8 to 11, 1891, may, if thoroughly observed, lead to most important conclusions."

— The Meteorological Department of the Government of India has published Part IV. of "Cyclone Memoirs," being an inquiry into the nature and course of storms in the Arabian Sea, and a catalogue and brief history of all recorded cyclones in that sea from 1648 to 1889. The work, says *Nature*, which has been prepared by Mr. W. L. Dallas, chiefly for the use of mariners navigating those parts, will no doubt be of considerable use to them, as hitherto there were no track charts of the storms in the Arabian Sea for the different months. For the majority of the storms quoted the available materials are admittedly very scanty; nevertheless, the author has been able to draw some useful conclusions from them with reference to the general behavior of the storms. The paper is divided into two parts—the first gives the details of each of fifty four storms in chronological order, the second treats of their geographical distribution and movements according to months and seasons, and the discussion is followed by charts showing the tracks of the storms in the different months. The cyclones are formed on the northern limits of the southwest monsoon; when the northern limits of the monsoon reach the land, and also when the northeast monsoon extends from Asia to the

equator, which is the case from December to March, no cyclones are formed over the Arabian Sea. The barometric fall is gradual and equal on all sides, except near the centre, and a depression of 0.25 inch below the average is indicative of the existence of a cyclone in the neighborhood. When the storms are in confined waters they may burst with great suddenness, but in other cases strong winds are felt for several hundred miles around the centre. The northern parts of the Arabian Sea are liable, during the prevalence of the northeast monsoon, to be disturbed by small cyclonic storms descending from the highlands of Persia and Beluchistan, but the whole of the southwest of the Arabian Sea, though liable to southwest gales during the summer monsoon, and to strong northeast winds during the winter monsoon, is free from cyclones.

— The Iowa Academy of Sciences will convene in Des Moines, Iowa, December 29, 30. A full attendance and a complete programme is announced. The president of the academy is Professor C. C. Nutting, of the State University; Professor Herbert Osborn, of the State Agricultural College, is the secretary.

— An Austrian expedition for the scientific exploration of the Mediterranean found on July 28 last, between Malta and Crete, in 35° 44' 20" north latitude, and 21° 44' 50" east longitude, a depth of 14,436 feet, the deepest sounding yet taken in the Mediterranean. At 22½ miles south-east a sounding of 13,148 feet was taken.

— Dr. E. Von Drygalski, at a meeting of the Geographical Society, October 10, spoke upon his expedition to Greenland in the summer of 1891, according to the "Proceedings of the Royal Geographical Society." The inland-ice and glaciers of Greenland present the nearest comparison to the conditions which must be supposed to have prevailed in the most recent geological time over the greater part of Germany, when the Scandinavian glaciers extended as far as the Hartz and Riesengebirge. If one desires to investigate more closely the circumstances under which the movement of such enormous ice-masses took place, one must, in order to a successful inquiry into this subject, make one's studies not on the small glaciers of the Alps, but on the glaciers of Greenland, which stand in direct connection with the great ice-covering (130,000 square miles) of the interior and in their movement, which reaches a velocity, unheard of in the Alps, of 35, 70, and even 100 feet a day, are indicative of the force of the inland ice itself. The principal task of the expedition was to investigate the conditions of movement of the ice-masses of Greenland and their main physical features for one year. But because it was impossible to transport, during the present year, in the vessels of the "Greenland trade" which from Copenhagen carry on the commerce with the colony, the complete equipment necessary for wintering in the polar regions, and inasmuch as it appeared desirable to first of all come to a decision on the spot as to the point at which a station should be established, it was decided to despatch a preliminary expedition for this purpose in the summer of 1891. This expedition sailed from Copenhagen on the 3d of May, and on the 16th of June reached Jacobshavn. The intention was to travel from here across the ice-fjord to Clausshavn, and then to reach, via Tasnisk, the great Jacobshavn glacier. But this proved to be impracticable, because all the fjords were choked full of ice. An attempt had therefore to be made to reach the glacier overland from the north. From the visit to the glacier it was ascertained that the edge of the glacier had not shifted to any considerable extent since Hammer's measurements in September, 1879. On the 20th of June the expedition set out from Jacobshavn, and proceeded by way of Ritenbenk through the Vaigat to the Umanak fjord, and arrived at Umanak on the 29th of June. From this point the party made their way to the little settlement of Ikerasak, situated in the interior of the fjord, whence different excursions were undertaken to the Sermilik, the Karajaks and the Itiodillarsuk fjords almost up to the limit of the inland ice. The Store Karajaks Isbræ was determined upon as the best place for the station to be erected in the year 1892. On the 29th of July the return journey from Umanak was commenced, and on the 18th of September Copenhagen was reached.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE JAPANESE EARTHQUAKE.

ON the 22d of October I left Japan, and on arrival in Victoria, B.C., found that six days later there had occurred the most disastrous earthquake of recent years. Previous to my departure shocks had been increasing in frequency, and several severe ones had been reported from the southern provinces. A sharp shock was felt in Yokohama about 6.30 of the 22d, which perceptibly swayed my brother's house, and caused things therein to move and rattle freely, the tremors lasting two or three seconds. During the summer I had made the ascent of Fuji, Asama, and other mountains, and had visited all the places of importance along the Inland Sea. I spent several days in Kobe, Osaka, Kyoto, Nara, Nagoya, etc., and in other districts which have suffered so severely from the earthquake of the 28th of October. At this time there were no signs of the impending destruction. By the last mail I received from my brother papers up to the 18th of November containing very interesting accounts of the disasters and phenomena at the various places. Some details of the event have been already given in your columns, but a few additional items may not be without interest. In Yokohama the damage was inconsiderable and confined chiefly to chimneys and windows, with no loss of life or limb. The chimney of the Electric Light Works fell, and caused a stoppage of light. At Kobe a slight shock was felt at about 4 A.M., but this was only the precursor of the severer one which came at 6 h. 34 m. 35 s., and which lasted thirty six seconds. A large number of chimneys were thrown down, crashing in many instances through the roofs, and buildings were badly twisted and strained. In some of the curio shops there was a large breakage of valuable goods. The centre of the disturbance was, however, more to the eastward, and the prefectures of Gifu and Aichi (in which is Nagoya) suffered most excessively. The great city of Osaka, second only in population to Tokio, sustained serious damage. The shock occurred at 6.39 A.M., and about twenty

followed during the forenoon. Many lives were lost by the collapse of some of the spinning factories. The Naniwa mill, a brick three story building, had a span of 120 feet, and the walls, apparently not properly tied together, separated so as to allow the roof to fall in, and many of the employees were killed or wounded. In the foreign settlement (Kawaguchi) nearly all the houses lost their chimneys and suffered more or less damage otherwise. The bridge across the Yodagawa at this point was also broken by one of the piers sinking several feet. The veneral Bishop of Exeter and his son, Bishop Bickersteth of Japan, were guests of Venerable Archdeacon Warren and narrowly escaped injury from the chimney falling through the house. The arsenal and mint sustained loss through the distortion and breakage of chimneys, etc., but there appears to have been no loss of life in these more substantial buildings.

In the town of Gifu the destruction was widespread, and the number of killed and wounded very great, while fires broke out, which were not finally extinguished until the 30th, and added to the loss of property. The Tokaido Railway through this region suffered severely by the destruction of stations and bridges, and the loss has been stated at \$500,000. All the villages along the line were disturbed, and some almost totally destroyed.

Nagoya, a fine city of nearly 200,000 inhabitants, received great injuries, and the loss of life and property was terrible there. The shock is reported to have occurred at 6.30 A.M., and 200 shocks to have been felt during the forenoon. All the brick buildings in the city except two, that of the Electric Light Company and the railway freight shed, were wrecked. The roof of the post-office fell in and four of the employees were killed, and the prison was destroyed and many of the inmates killed or wounded. An early morning service was being held in the Methodist chapel, and four of the native Christians were killed, and Mr. and Mrs. Van Dyke and several natives badly wounded. The embankments of the Kiso River were broken, and several villages were swept away and many people drowned by the escaping flood.

The foregoing are but a few of the details of this fearful catastrophe; the mere list of the places which suffered (Shizuoka, Hamamatsu, and other important towns included) would alone take up too much space. At Nagoya the vertical movement is said to have been eight and a half inches, and an Osaka correspondent describes the houses as literally dancing, and the trees swaying to and fro as if in a gale. Mount Asama (only smoking heavily when I was on it in September) was started into greater activity and was sending forth flames and ashes, and Mount Ibuki (between Gifu and Lake Biwa) was also in eruption. The sea is said to have been violently disturbed in various places, even far from land, and the captain of the "China," which left Hongkong on the 31st of October, reported in Yokohama: "Nov. 3, at 6 45 P.M., passed Suwusima twelve miles off. The volcano on the island was in eruption, shooting flames to the height of about 800 feet, at intervals of about thirty seconds."

Shocks continued at frequent intervals for several days after the first destructive one, but were diminishing in number and strength. The following are the latest figures for the prefectures of Aichi, Gifu, Fukui, and Mikawa, the most of the loss having been suffered by the two first named: Killed, 7,260; injured, 11,716; buildings (temples, dwellings, warehouses, etc.) destroyed, 111,566, and damaged, 53,683. The greatest loss of life appears to have been due to modern brick buildings and to the early hour, when people had not left their houses.

W. HAGUE HARRINGTON.

PHYSIOLOGY OF GASTRIC DIGESTION.

THE foundations of our knowledge of the physiology of gastric digestion were undoubtedly laid by the careful study of the historical case of gastric fistula by Dr. Beaumont—the case of Alexis St. Martin. Animal experimentation and the test-tube reactions of the laboratory cannot be compared in accuracy to observations made directly upon the living human organism, when these rare opportunities arise which permit of such a study. Then, too, it may happen that a considerable rectification of current physiological doctrine has to be made, and the laboriously gathered results of many observers have to be replaced by those made upon a single case. Much depends, then, upon the skill and thoroughness with which the study of the processes in the human subject are undertaken.

It must be admitted that these qualities are conspicuous in the recently published records of a study of the chemical processes of the small intestine by Drs. McFadden, Nencki, and Sieber. The subject of their researches, says *Lancet*, was a female patient under the care of Professor Kocher, in whom an intestinal fistula had resulted from excision of a portion of gangrenous intestine due to strangulated hernia. The false anus was situated in the ileum just above the ileo-cæcal valve, so that the materials escaping thereby were wholly composed of the chyme which had passed through the whole length of the small intestine. For a period of nearly six months the woman lived under these conditions, permitting of a long series of observations relative to the time and character of intestinal digestion under varying forms of diet, etc. At the end of that time Professor Kocher re-established the natural channel by means of an operation which proved perfectly successful. It may be remarked at once that during the whole period when there was practically no large intestine the patient gained in weight, and, as the urinary analysis showed, eliminated a fairly normal quantity of urea.

The procedure consisted in adapting a flexible tube to the fistulous outlet, so as to collect all the material that escaped, and to note its characters under varying circumstances. In consistency this "chyme"—if it may be so termed—was more fluid and diarrhœal when the diet was albuminous than when it was mainly of a vegetable nature. It was seen that the flow of chyme from the small into the large intestine is steadily continuous, being least marked during the night, owing to no food being then taken; and by some ingenious experiments (e.g., the addition of hard beans to the food, or of salol, which allowed of the detection of salicylic acid in the matters escaping) it was shown that the passage of foods from mouth to cæcum occupies at the least two hours: but all traces of the substances introduced did not disappear for from nine to fourteen or even twenty-three hours. The rate of flow, of course, bears much relation to the consistency of the intestinal contents. As regards the nature and properties of the evacuated materials, it is noticeable that they were almost free from odor, containing hardly any products of albuminous disintegration, such as indol and sulphuretted hydrogen; they were slightly acid in reaction, tinged yellow by bilirubin, and, according to the predominance of flesh or starchy matter in the food, showed muscle fibre, albuminous granules, vegetable fibres, starch granules, etc., and invariably a large number of various forms of bacteria. The filtrate yielded albumen, mucin, peptone, dextrose, the two forms of lactic acid, acetic acid, and the biliary acids and bilirubin.

The authors enter very fully into the characters of the

bacteria they find, many forms being special to the small intestine, others existing also in the mouth; but, passing over these, which would entail a full description to be intelligible, we may glance at the main results of their researches, which somewhat modify accepted physiological teachings. One point of interest is the fact that albumen is hardly, if at all, decomposed in the small intestine. Even the action of the tyrosin of the pancreatic juice is small, for leucin and tyrosin were not to be found. Probably, in health, albuminous disintegration takes place chiefly in the large intestine, and it is only in disease that it occurs in the stomach or small intestine. Amongst the products of such decomposition are iodol, skatol, phenol, sulphuretted hydrogen, carbonic acid, methylmercaptan, etc., all of which may be regained from the large intestine. The bacteria of the small intestine are concerned in the disintegration of the carbo-hydrates into lactic, acetic, and succinic acids, and also into ethylic alcohol. The authors, in noting this last-named fact, cannot avoid a thrust at the total abstainers. It is generally believed that the chyme is rendered alkaline by the secretion of the small intestine, but they find that, owing probably to the reinforcement of gastric acidity by the organic acid resulting from sugar, the total quantity of acid is more than can be neutralized by the bile, pancreatic, and intestinal juices. If, however, the alkalinity of these fluids be diminished, the intestinal contents are hyper-acid, and mucin is precipitated instead of being intermingled with the chyme. This explained the diarrhœal quality of the evacuations noted to be associated with a large amount of sugar and organic acid in the chyme. On the other hand, an excess of alkalinity favors putrefactive decomposition, the acids apparently holding in check the bacteria concerned in albuminous disintegration. A marked contrast in this respect was exhibited between the small and large intestine. Putrefactive bacteria could hardly be at all isolated from the former, whilst they abounded in the latter; but this is not owing to the influence of bile, which Nencki showed to have no real antiseptic property.

The part played by bacteria in intestinal digestion is limited probably to the fermentation of sugar and carbo hydrates generally, the excess of acid resulting from this fermentation being neutralized by the alkaline intestinal juice. But, much as bacterial life abounds in the intestinal canals, varying according to the kind and quality of the ingesta, it does not appear that the processes initiated by these organisms are of such value or importance in nutrition as the chemical fermentations. Certainly the patient who was the subject of these observations gained in flesh, although for six months she was deprived of all the bacterial processes that go on in the large intestine.

OCEAN CURRENTS AND TEMPERATURES IN EAST ASIATIC WATERS.

UNDER this title Dr. Gerhard Schott contributes to a recent number (ix.) of *Petermann's Mitteilungen* an interesting paper, which contains new information regarding the course of the Kuro-Shiwo and other currents in Chinese waters, and also as to ocean temperatures. The conclusions arrived at by the author are based upon researches made by him among the archives—principally ships' journals—of the German Admiralty, which contain observations of great value to science. With regard to the Kuro-Shiwo, the general result of Dr. Schott's researches, says the *Proceedings of the Royal Geographical Society*, is that this great ocean current is not so extensive as hitherto supposed. Throughout the whole of the year the warm stream is confined as a constant current exclusively to the west side of the line of islands,

Meiaco shima, Lu-Chu, and Lingshoten, while the sea to the east, although showing at times displacements to the north-east, is otherwise quite motionless. The supposed constant current of considerable velocity just east of the Lu-Chu Islands does not exist. The Kuro-Shiwo, in the northern part of its course, shows more tendency to break through the island barrier to the east. Its principal outlets in this direction are the Colnet Straits (30° north latitude) and the Van Diemen Straits (31° north latitude). From this point to the meridian of the Kii Channel the current reaches its greatest extent, and flows pretty close to the land in a north-east direction, with a striking bend, under 135° east longitude, to the south-east, resuming as it flows at some distance from the coast up to Yokohama its old north-east direction.

Under the 38th parallel east of Cape Kinkuasan, the Kuro-Shiwo strikes the Oga-Shiwo, i.e., the cold Kurile current from the north. The observations of ships in this region show that often in a few hours the temperature of the water falls 20° and 30°, and the temperature of the air also; the weather becomes cold, muggy, and rainy, and the color of the water changes from the blue or blue-black of the tropics to the well-known bottle green. The boundary line between the Kuro-Shiwo and the Oga-Shiwo, from February to April inclusive, is under 38° latitude and 143° to 145° longitude; in May, under 42° and 147°; in July, under 45° and 150°; and in August, lies north of 50° latitude. The polar current here does not extend at any time below 38°. The analogy between the Pacific and Atlantic in this respect is almost complete. The Oga-Shiwo is the Pacific Labrador current, and Cape Kinkuasan plays the part of Cape Race, except that the latter lies 10° further north than Cape Kinkuasan. After meeting the polar stream, the Kuro-Shiwo turns east, but Dr. Schott does not follow it in its further course. Running parallel and to the east of the Kuro-Shiwo is a second though less important warm stream, called the Bonin current, which comes from the south and flows in a north, north-east, and then east-north-east direction. At 130° east longitude it flows east in a course which former maps showed as the course of the Kuro-Shiwo. The Bonin current does not always flow to the west of the Bonin Islands; its mean axis of movement varies with the season of the year, and at the end of summer lies to the east of the Bonin Islands. In this case also there is an analogy with the phenomena of the North Atlantic, as Krümmel's investigations have showed that east of the Antilles and of the Florida current there flows a broad though not intensive stream in a similar direction. Dr. Schott discusses the influence of the winds upon these currents, and gives some important information with regard to currents in the Straits of Formosa and the Yellow and Japan seas. The second part of his article is devoted to water temperatures in these regions.

THE BOURBONS AND ARCHÆOLOGICAL REMAINS.

It would naturally have been thought that the Restoration would have made it a special care to restore and preserve the monuments of the past, but it is a remarkable fact that this epoch was the commencement of a system of almost limitless destruction of the edifices which the Revolution had spared, and that the change of dynasty in 1830 has certainly been productive of benefit in this respect at least. In the time of Napoleon the Minister of the Interior, by his circular of June 4, 1810, proposed a long series of interrogatories to all the prefects relative to the actual condition of the old castles and abbeys in their respective departments. These documents are replete with curious and interesting facts. Under the Restoration, M. Simeon, when Minister of the Interior, adopted a similar measure, but it does not appear that any practical results were obtained. The lamentable system of indifference which prevailed on this subject up to 1830, says a writer in *The Architect*, may be inferred from the terms of that ordinance which can never be sufficiently regretted, by which the splendid dépôt of historical monuments formed at the Petits Augustins was destroyed and dispersed under the pretext of making restitution to owners who no longer survived, or who did not know what use to make of the objects so restored to them. It is believed that not one of the monuments given back to individual owners has been preserved; and, notwithstanding the notorious difficulty of

disposing of these splendid relics, a steady refusal was constantly returned to the reiterated requests of M. Lenoir, the founder of this unique museum, to re-establish his collection with what remained after restitution had been made to every known proprietor. This contempt for and unpardonable neglect of antiquity in a Government whose chief claim to respect was derived from the principle of antiquity, extended even to the Conservatoire de Musique; the curious collection of ancient instruments of music which had been formed there was ordered to be dispersed or sold at a low price. This ruinous system, which prevailed in Paris, was practised on a still more extensive scale in the provinces. It would scarcely be believed that, under a moral and religious government, the Corporation of Angers, which had for its chief a deputy of the extremest ultra-loyal opinions, should have been allowed to convert the Gothic Church of St. Peter into a theatre. It is still more incredible, but not the less true, that the Church of St. Cesaire at Arles, which the most erudite antiquaries looked upon as one of the oldest in France, was transformed *en mauvais lieu*, without any public functionary protesting against such profanation. Who would think that no effort was made, when the Most Christian King returned to the throne of his fathers, to rescue the magnificent papal palace at Avignon from its military desecration? And who could credit the fact that at Clairvaux, in that celebrated sanctuary which was directly connected with the authority of the State, the exquisite church, so beautiful in its proportions and so complete in its grandeur, which dated from the twelfth century, and was said to equal Nôtre Dame, at Paris, in size, which was begun by St. Bernard, where so many queens, princes, and pious generations of monks were entombed, and where the heart of Isabella, the daughter of St. Louis, was deposited, that this edifice, which had survived the havoc of the Revolution, and the indifference of the Empire, should have been demolished in the very first year of the Bourbon restoration? It was then razed to the ground, with all its projecting chapels, without leaving one stone upon another, or even sparing St. Bernard's tomb, to make room for a square surrounded by trees in the centre of the prison which occupied the site of the venerable monastery. Before leaving Clairvaux, we may as well mention that a prefect of the department of Aube, under the Restoration, actually sold seven hundred pounds weight of the archives of this famous religious house, and which were removed to Troyes; and the Count de Montalembert stated that, when he was at that place, he walked over a heap of parchments strewn thickly on the floor, from which he picked up a bull of Pope Urban IV., the son of a shoemaker of that very city of Troyes, and probably one of its most illustrious children. The same prefect demolished the relics of the palace of the ancient counts of Champagne, of the noble and poetic dynasty of the Thiebauds and Henri-le-Grand, because they were in the line of a crescent which his architectural genius had unfortunately devised. The beautiful gate of St. Jacques (constructed in the time of Francis I.) and that of Beffroy suffered the same fate. Another prefect of the Restoration, in the department of Eure and Loire, had no scruple in appropriating to his own use several painted windows of the Cathedral of Chartres to decorate the private chapel of his country mansion. It has been incontrovertibly proved that during the fifteen years of the Restoration more irremediable devastations were committed in France than in the period from 1789 to 1813. This destruction was certainly not enjoined by the Government, but it was done under its eyes, with its tolerance, and without exciting the slightest marks of its solicitude.

ANTIQUARIAN DISCOVERIES NEAR ALEXANDRIA.

In the London *Times* of Oct. 12 appeared a telegraphic announcement of the late interesting antiquarian discoveries at Abukir, distant thirteen and a half miles by rail eastward from Alexandria.

Excavations are being continued under the direction of Daninos Pasha, a savant well qualified for the work, to whom is due the merit of the discoveries; and if Government will supply the funds necessary to enable him to continue his researches, there are abundant indications that valuable "finds" will be made in a locality

hitherto almost neglected by archæologists, and presenting much that is interesting, especially to students of the Græco-Roman period.

At four to six feet below the surface the diggers found three statues in rose granite, ten feet high, lying face downwards, among the ruins of a temple, of which part of the outer wall with lower portions of columns and several square yards of flooring have been laid bare. The statues had been originally erected at or within the temple, and one of them is lying in front of its pedestal, which is about three feet high. They represent in a group, according to the hieroglyphic inscription, Rameses II. (the Greek Sesostri-s) and his Queen Hentmara seated. The third statue is of Rameses II. in an upright posture, wearing a pleated tunic, bracelets, military crown, and a girdle bearing the inscription, "Beloved of Seth." At his left side he holds a sceptre, surmounted by the head of his son Menephtah (the Pharaoh of the Exodus), whose cartouch is inscribed on the sceptre. On the plinth at his back, which is of equal height with the statue, is chiselled a bas relief of Queen Hentmara in profile, wearing a pleated tunic and the royal tress. The inscription above her head is "Daughter of the King—beloved of her father—Royal spouse—great favorite Hentmara." On the back of the plinth is carved the royal banner of Rameses II., with all his known titles and appellations. The execution of the three statues is in the plain, vigorous style of the Twelfth Dynasty.

The feet of Rameses, which had been broken off in one piece with a clean fracture, were found at a few yards' distance. The two heads of the group have also been broken off, and are being searched for.

It is surmised that the temple and statues were overthrown after the edict of Theodosius, A. D. 380, abolishing the Egyptian religion, but nothing has yet been discovered to identify the temple with any of those known to have existed during the Egyptian or Græco-Roman periods.

Dr. Nerutsos Bey's interpretation of the inscription is—Hentmara, daughter of the King, beloved of her father (i.e., the preceding King Osiris Menephtah, who was father of both Rameses and Hentmara), royal spouse (of Rameses II.), the (referring also to Rameses) great favorite of Seth.

The Pharaohs, following the example of Osiris, King of the Gods, and his sister Isis, had the prerogative of espousing their own sisters, and this custom, consecrated by both the civil and religious law, was followed in several instances by the Ptolemies.

Dr. Nerutsos, who is a well-known Egyptologist, has lately published a work entitled "L'Ancienne Alexandrie," embodying his researches, made during a long residence, and he is perhaps the greatest living authority upon the topography of the ancient city and neighborhood of Alexandria. Referring to the locality in which the above-mentioned antiquities were found, and which abounds with remains of old buildings, he recommends that explorers should seek to identify—

(1) The small Egyptian town Menuth, with its temple to Isis, and subterranean burial-places. Such a place has just been discovered by Daninos Pasha, in the solid rock, entered by a vertical shaft forty feet deep, and a sloping staircase of forty-five steps, terminating at the bottom of the shaft, where a series of galleries commence, extending in length to 170 feet.

(2) The Græco-Roman village Zephyrion, where stood a temple to Artemis Sotera, and numerous country villas.

(3) The headland Zephyrion, on the highest point of which was a temple to Venus Arsinoe, Protectress of Mariners.

(4) The Byzantine monastery of St. Cyr, corrupted to Abba Kyr, whence the name of the present town of Abukir.

The monastery and neighboring buildings were destroyed by an earthquake, followed by a tidal wave, soon after the capture of Alexandria by the Arabs. More than a dozen sphinxes and ruins of massive buildings, submerged by that catastrophe and subsequently, are now plainly visible in the shallow waters of the bay.

THE FAIRBANKS MUSEUM.

TUESDAY evening, Dec. 15, was a holiday occasion for St. Johnsbury, Vt., for she was at that time the glad recipient of such a Christmas gift as rarely falls to the lot of a community—such a gift as will make her a leader among New England villages in the possession of peculiar educational advantages. Col. Franklin Fairbanks, in fulfilment of his long cherished desire, presented the Fairbanks Museum of Natural Science to the people of St. Johnsbury.

In his address Col. Fairbanks said: "This day, one of the happiest of my life, marks the completion of a plan long cherished; that of erecting a building suitable for the objects in natural science which I have been collecting from my boyhood.

"There is implanted in the breast of every intelligent being a desire for knowledge. Schools are established to develop that desire and expand it into larger fields, fitting us for usefulness in the world, and giving us pleasure and profit. Who has looked through a telescope at the stars, without wishing to know what there is in, or upon them, and desires to look again, hoping to discover something that is beyond? Who has used the microscope to examine the flower or the insect, which is invisible to the naked eye, without longing to know more of what this wonderful instrument alone can reveal? In so far as is possible, this thirst for knowledge should be gratified.

"Those of us who have not had the privilege of a liberal education (so-called) must make up for our loss by the study of objects and beings directly around us, using our eyes and our ears, which may become the windows of our minds, letting in a flood of light and knowledge.

"Life is so short and its limitations are so great, no person can know everything, but each may learn one thing, and learn it well. The child may not be able to calculate eclipses, or understand conic sections, or Greek roots, but he may begin early to learn of the life about him. For this, I have erected this building, and made accessible to you this fruitage of my own observations.

"The collection comprises illustrations in ethnology, ornithology, oology, entomology, zoology, conchology, botany, mineralogy, geology, and palæontology.

"At the laying of the corner-stone of the Museum on the 4th of July, 1890, I told the children that I commenced my collection when a small boy, gathering stones and minerals, because of their beauty. To illustrate, I hold in my hand a grouping of crystals, which I found on the Willey Slide in the White Mountain Notch, when I was about twelve years old. My father was taking me with him on a journey, and we stopped to see the slide which a few years before had buried the Willey family, and this stone attracted my attention, and to-day brings that visit vividly to mind.

"I have been a careful observer, going about with my eyes and ears open. Not a bird comes within my vision but I try to learn its name, its habits, and its uses, and its song if it has any. In the summer time this is a never-ending source of delight, and so I might mention butterflies, beetles, and all insect life; the flowers and ferns and many other objects of study which live and move in great profusion about us all the summer long.

"Now if this collection will create in you a desire to know the facts regarding the life which is around you, and which your eyes see and your fingers touch; in short, if you are thereby induced to study and investigate the things that are nearest you, my aim will be accomplished, and I trust through the aid you may receive in yonder building, you may make far greater progress than I can comprehend.

"A long time since, I asked our architect, Mr. Packard (by whose skill and taste our town has been greatly enriched), to devise some plan by which the collection could be opened for the public benefit, while remaining in my house, but that seemed impracticable, so I abandoned it.

"The building is now complete. It consists of a main hall, with a gallery, for cases and tables. On the first floor of the ell is a curator's office and a class-room. On the second floor and over the class-room and office is a well-ventilated lecture-room. All the rooms are thoroughly equipped for use. In the basement are the furnace for heating, and a large, well-lighted laboratory and taxidermist's room. The whole building is lighted with both

gas and electricity. For a year and a half the curator, Miss Tyler, has been classifying and cataloguing the collection and preparing suitable labels, giving name and location of the specimen, together with a reference to some book where a fuller description can be found, thus making it, not what too many collections are, a dead affair, but really a thing of life, which shall help in your search for knowledge. I hope additions may be made, by those interested in these things, of such objects as shall be worthy and useful in aid of the work in hand. Should persons have in their possession any objects of merit, illustrative of natural science, which they do not care to donate, but would like to loan, they may be shown to the trustees, and, if approved, may find a lodgment in the museum and be marked "loaned," to receive the same care as is bestowed upon the rest of the collection.

"It is my expectation that studies in the natural sciences will be introduced into our public common schools in all grades, from the primary to the senior, and that arrangements may be made between the prudential committees of the schools, the faculty of the academy, and the trustees and managers of the museum, for classes to be held in the class-room of the museum at such times as are best. Objects from the collection may thus be used by way of illustration under suitable and proper regulations. In this way the museum will truly become a factor in the education of our children and young people.

"It is my desire that its usefulness may not be restricted to the public schools or academy of this town, but that it may be open to the inspection and use of any school or class in the county or State. It is my desire that this institution shall take its place with other public institutions, as an educator for the young, lifting all who shall avail themselves of its advantages to a higher and larger knowledge concerning the things of God's creation, which lie all about us, now, practically, for many, a sealed book.

"It is my desire that the museum shall be opened free to all at such times as the trustees may direct, and that the public observe such rules and regulations as seem necessary and wise to be made.

"I cannot let this opportunity pass without grateful mention of the very valuable aid rendered, and advice given, by her who is the sharer of my joys and sorrows, the companion of my home. For years we have worked together in making this collection and in planning for this building, and to her I feel that much of its success is due.

"And it gives me pleasure to say that here is no debt upon the building or land, and that the institution is endowed, with an amount sufficient to maintain it for all time, if the funds are properly invested and the income judiciously expended."

BOOK-REVIEWS.

Fossil Botany, being an Introduction to Palaeophytology from the Standpoint of the Botanist. By H. GRAF ZU SOLMS-LAUBACH, Professor in the University of Göttingen. Authorized English Translation by Henry E. F. Garnsey, M.A., Fellow of Magdalen College, Oxford. Revised by Isaac Bayley Balfour, M.A., M.D., F.R.S. New York, Macmillan. 8°.

THE superb English edition of Count Solms-Laubach's "Einleitung in die Paläophytologie" which the Clarendon Press has recently brought out is now in the hands of paleontologists and botanists. The original German edition, which appeared in 1837, was briefly noticed by the present writer in the *American Journal of Science* for July, 1888 (p. 72), after a careful reading, and the impression which such a reading produced was then recorded. The daily use of the work since that time as a laboratory textbook has somewhat modified that impression, and an English translation of it is, to say the least, a very welcome accession.

The attempt has been several times made to reduce the science of fossil plants to a form adapted to general use. There is no science which is less accessible to the student from the scattered and fragmentary character of its literature, and every effort to collect this and present it in compact form should be thankfully received. Among other works that have claimed to do this should be mentioned the Marquis Saporta's "Monde des plantes avant

l'apparition de l'homme" (1879), the late Dr. Schenk's "Fossilien Pflanzenreste" (1888), and Sir William Dawson's "Geological History of Plants" (1888). Of these the first-named realizes much more nearly than any of the others this claim, being popular in its treatment and covering the entire field, both geologically and botanically. The second is a condensation or abridgment of the elaborate treatise on the general subject in Zittel's "Handbuch der Paläontologie," begun by Schimper and finished by Schenk. But the abridgment is carried too far and the mode of presentation can scarcely be called popular. Sir William Dawson's work avoids these defects, but has the more serious one of both geological and botanical incompleteness, making it little more than a popular account of the paleozoic flora of Canada. The present work is open to a similar criticism, as it confessedly takes no account of anything later than the mesozoic, and has nothing to say about the geological history of the type of vegetation now dominant on the globe, viz., the dicotyledons, which, nevertheless, are known to have flourished in earliest cretaceous times, and which of all fossil plants may, at the present time, at least in America, be said to be the most interesting from the botanical, and the most important from the geological point of view.

The merits of this work, therefore, consist neither in its popularity nor in its generality. In what, then, do they consist? To what class is the work useful, and how can it be used? The treatment of the several forms of extinct vegetation which the author has selected is too thorough, minute, and technical for the non-botanical reader to follow. It is of little use to the geologist because, as stated on the title-page, it proceeds from the botanical standpoint. Botanists proper, who ought to profit most by it, are not likely to do so on account of the lamentable divorce of botany from paleobotany, as though fossil plants were not plants, and as such as worthy of study as living ones. If this work succeeds in dispelling to some extent this illusion it will certainly be useful. But dealing wholly with the lower forms, and largely with their internal and minute structures, so greatly neglected by botanists, it is not likely to accomplish this to any great extent.

It is, then, the paleobotanical student who, if any one, is to use this work. If he wishes to cover the whole field he usually has access to most of the literature of the subject, and is already familiar with the sources from which most of the work is compiled. If he wishes to make a systematic review of this literature he naturally goes to Schimper's "Traité de Paléontologie Végétale," and Zittel's "Handbuch der Paläontologie," Abtheilung II., where Schimper, and after his death Schenk, have admirably condensed it, but still have left it much more full than here. If he wishes to acquaint himself with the original investigations thus summarized, he goes to Williamson, Renault, Grand'Eury, Zeiller, Weiss, Saporta, and the rest, who have furnished the facts. In so far as Count Solms has himself contributed in this work to these original investigations, a not inconsiderable part of it, it is useful to this class of students. But unquestionably the most important service which he has here done has been to put on record the matured judgment of a structural botanist of the first rank respecting the probable nature and significance of the many problematical extinct forms of vegetable life that have been found in ancient strata. Whenever one of these problems arises the first question the paleobotanist now asks is, What does Solms-Laubach say? It is true that he entirely omits many such forms, that he frequently contents himself with stating the opinion of others, and that quite as often he declares that the facts do not warrant an opinion. But on many points his mind is made up, and it must be said to his credit that he has not attached himself to any particular school, but appears to be guided entirely by the evidence as he understands it.

It is a great comfort, for example, to know that he regards the Cordaites as gymnosperms without asserting that they are conifers; that he does not accept the views of some French paleobotanists that the secondary or exogenous growth in Sigillaria, Stigmara, and Calamodendron necessarily relegate these forms to the phanerogams; that he considers Stigmara as the roots of Sigillaria, Lepidodendron, etc., and does not admit the two kinds of Stigmara maintained by Renault; that he opposes the view of Renault that Sphenophyllum is related to Salvinia, and while regarding the

group as *sui generis* and incapable of being brought within any classification of living plants, inclines to see its nearest affinities in the Lycopodiaceæ; that of all the different views that have been held as to the affinities of *Spirangium* he regards that of Nathorst as the most attractive, viz., that it may represent the gigantic sporangia of *Chara* surrounded by spirally twisted envelope-tubes; and that he leans to the conclusion that *Williamsonia* belongs to the Cycadaceæ, or to some analogous type of vegetation.

The most serious charge that must be made against this English edition is that it has not been revised to date. No science is progressing more rapidly than paleophytology, and the department that is advancing the fastest is our knowledge of just such problematical forms as those considered in this work. In making a translation it would have been easy to introduce the result of the investigations of the last four years, and the value of these results would have been very great to the class who are certain to make the most use of the work. But although it is said to be an authorized edition, it seems to be nothing more than an exact translation of the German edition of 1887.

For, example, nothing new is presented in relation to *Bennettites*, on which the author has been so long engaged. On page 97 the remark of the original edition that "the sketch here given of *Bennettites*, which I hope to make more complete at some future time," etc., is repeated without modification. But the "future time" came more than a year ago, and the Count's able researches on this form were published in the *Botanische Zeitung* for 1890 and noticed by the present writer in the *American Journal of Science* for April, 1891, p. 331. Still later the interesting specimen from Golden, Col., which Lesquereux called *Zamiostrobus mirabilis*, has been sent to him, and he has made sections of it and referred it to the same genus, which he now properly calls by Buckland's earlier name, *Cycadeoidea*. All this new matter should have been incorporated in the English edition.

We are never sure that we have the author's present opinion on the most problematical forms. Nothing is said of the recent discoveries of Zeiller, Saporta, and others respecting *Spirangium* and *Fayolia*, from which these authors are now disposed to give them over entirely to the zoologists as probably of animal origin. We should be glad to know what the successor of De Bary thinks of this. And it is amusing to read on page 371, where *Williamsonia* is under discussion and the early views of Saporta and Marion are considered, to learn that "it is hoped that a publication yet to come from Saporta will contain further and more convincing particulars on this subject." Paleobotanists have been familiar for at least three years with the "publication" referred to, as it appears in the "Paléontologie française, Plantes jurassiques," Livraisons 36-39, pp. 87-191, where the subject has received the most exhaustive treatment yet given to it, illustrated by seventeen plates. What we want to know is whether the professor of botany at the University of Strasburg agrees with the conclusion of the Marquis Saporta that the *Williamsonias*, without being precisely *Pandaneæ*, may have had a genetic relationship with that family (op. cit., p. 117). Solms Laubach's own conclusion, quoted above in which without the knowledge of Saporta's work, which might have modified it. It is also given without acquaintance with the important discovery by Nathorst of the inflorescence of *Williamsonia augustifolia* attached to the stems and foliage of *Anomozamites minor*, a supposed cycadean plant,¹ and, although this is confirmatory of the views above expressed, it would be interesting to know to what extent he regards it as conclusive; and, in general it would be very useful to know what this author's attitude now is toward Saporta's views as here expressed (op. cit., pp. 229-236), according to which not only *Williamsonia*, *Weltrichia*, and *Goniolonia*, but *Cycadeoidea*, *Anomozamites*, and other forms hitherto uniformly referred to the Cycadaceæ, are taken entirely out of the Gymnosperms and assimilated to the angiospermous orders *Balanophoreæ* and *Pandaneæ*, and are grouped under his new and extinct class of *Proangiosperms*.

The *Sphenoglossum quadrifoliatum* of Emmons,² twice men-

tioned,³ was carefully considered in 1883 by Professor Fontaine, and referred doubtfully to *Actinopteris*, a genus of ferns, in a work with which the author should have been acquainted,⁴ and in treating the Cycadaceæ in this volume, as well as in his later studies of the Portland Cycadeoideæ, he seems to be equally unfamiliar with the important cycadean trunks discovered by Tyson in 1860 in the iron ore beds of the Potomac formation of Maryland, and described also by Professor Fontaine in his great monograph of the flora of that formation.⁵

The "forty-nine illustrations" so prominently mentioned on the title-page as a high recommendation are indeed excellent and largely the author's own. but in view of the uses to which this work is likely to be put, as explained above, this number is obviously far too small. To have secured the maximum usefulness, even to the small class to whom it is adapted, several times that number would have been required.

The English publishers have left nothing undone to render the volume handsome and attractive, and as usual, where the publisher's point of view is alone followed, the convenience of the reader and user is often sacrificed to style and appearance. This is notably the case, and applies to the German edition as well, in the avoidance of italics. It may be admitted that the printing of all words having the Latin form in italics produces, in works of this class, a very unseemly effect, but the compromise which limits them to strict binomials, i. e., cases in which the species requires to be mentioned, reduces this evil from the esthetic point of view to a degree which is many times counterbalanced by the increased value which it gives to a work that is to be in constant use by busy students, who in nine cases out of ten are looking for some particular name. To compel this class to pore over a whole page for what, if italicized, would instantly catch the eye, is a positive cruelty to a deserving animal, and should be prohibited by penal enactment.

The placing of the references to the appendix to the literature in foot-notes at the bottom of the pages is a decided improvement from all points of view over the unsightly microscopic superior figures in the German edition, and perhaps in a work like this, where the same memoirs are frequently several times referred to, this general plan is upon the whole justifiable, but after all nothing is so simple, easy, and clear as the old way, in which the reader finds all he wants in foot-notes on the page he is reading, and this simplicity, ease, and clearness usually atone for considerable repetition as well as for whatever offence these foot-notes may give to the most fastidious eye.

If, from all that has been said, it should appear to any that the work before us consists entirely of a bundle of defects, let him hasten to divest himself of so false an impression. It is rather our purpose to point out these defects than to extol its excellencies, and should the latter be attempted it would require much more space than has been needed for the former task.

LESTER F. WARD.

AMONG THE PUBLISHERS.

THE Century Company is about to publish, in cheap tract form, the editorials on "Cheap Money Experiments" which have been appearing in *The Century*.

—Houghton, Mifflin & Co. will issue early next year John Fiske's work on "The Discovery of America." It has involved a vast amount of research, and Mr. Fiske is reported to regard these two volumes as his most important contribution to American history.

—In "The Platform: Its Rise and Progress," Mr. Henry Jephson, private secretary to Mr. Forster and Sir G. Trevelyan, beginning with the days when an open meeting for discussion of public affairs was condemned as scarcely less than overt treason, traces the slow growth of political speech making and analyzes the ele-

¹ Ibid., pp. 182 and 315.

² "Contributions to the Knowledge of the Older Mesozoic Flora of Virginia." By William Morris Fontaine. Monographs of the U. S. Geological Survey, Vol. VI., Washington, 1883, p. 120.

³ "The Potomac or Younger Mesozoic Flora." By William Morris Fontaine. Monographs of the U. S. Geological Survey, Vol. XV., Washington, 1889. Text, pp. 186-193; Atlas, pl. cixiv-cixxx.

¹ Öfversigt af Kongl. Vetenskaps-Akademien's Förhandlingar, June, 1888. No. 6.

² "American Geology," Vol. VI., p. 134, pl. v., fig. 2.

ments in its development. The open-air meetings of the Wesleyan revivalists had their share; the old right of petition to the crown for redress of any grievance, and the occasional waves of popular clamor gave it a fitful existence until, at the time of the so called "Wilkes Rebellion," it first became an organized political engine, then and since acting as a perpetual check upon the party in power. To the student of politics this book should prove of great value and interest. It will be published by Macmillan & Co. early in January.

— Frederick Warne & Co., New York, will shortly issue at a popular price "Electricity up to Date for Light, Power, and Traction," clearly explained, with diagrams, etc., for non-scientific readers, by John B. Verity, M.Inst.E.E. (London). The same firm will shortly publish the new volume of "Barker's Facts and Figures for the Year 1892," edited by Thomas Whittaker, containing a large amount of information relating to commerce, government, insurance, agriculture, population, education, finance, health, wealth, religion, railways, etc., with special reference to those matters which concern the inhabitants of Great Britain.

— A "General Encyclopedia of the History and Science of the Jews" has been undertaken by J. Singer, in Paris, and will comprise twelve large volumes, according to *The New York Tribune*. The author hopes to present the main facts of Jewish history, and

to show the effects of the Jewish race upon the various factors of civilization, science, literature, commerce, industry, etc. The work will not be finished for some time.

— The trustees of the British Museum, we learn from *The Publishers' Weekly*, will shortly issue the second instalment of Dr. Bezold's "Catalogue of the Cuneiform Tablets in the Kouyunjik Collection." This volume will contain the descriptions of nearly six thousand tablets and fragments which formed part of the famous clay library preserved by the kings of Assyria at Nineveh. This library was founded by Assurbanipal, B.C. 668-626, and contained official documents which had been sent to Sargon and Sennacherib by the generals of the army and others, as well as a series of works relating to every branch of science known to the Assyrians, and copies of ancient classical books and legends from Babylonia. In this volume will be found a classification of omen, and astrological texts; a work which has never before been attempted; and a considerable number of important extracts are printed in the cuneiform characters.

— Hubert Howe Bancroft, who is spending the winter with his family in the City of Mexico, has been requested by Gen. Porfirio Diaz, President of the Republic of Mexico, to write a book on the resources and development of Mexico, to be published in Spanish and in English, and to be a true and vivid representation of industrial Mexico as it exists to-day, primarily for presentation at the

NEO-DARWINISM AND NEO-LAMARCKISM.

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The report of the Postmaster General, just issued, states that nearly \$2,000,000 in checks, drafts and money, reached the dead-letter office during the present year through improper addressing—more than one-half from New York State. Probably double this sum has been lost through delays and accidents resulting from carelessness in mailing and correspondence. To reduce these errors to a minimum, the Government issues THE UNITED STATES OFFICIAL POSTAL GUIDE, in an annual number published in January, and monthly supplements, a book of 900 pages, containing three classified lists of the 66,000 post-offices in the Union, together with postal rules and mail regulations. Every merchant, wholesale dealer, manufacturer and professional man having correspondence, will find the Guide indispensable. It is also of great assistance in translating illegible writings to lawyers, printers and others. No establishment where accuracy and care are observed as rules is complete without it. The price of the GUIDE in paper is \$2.00, in cloth, \$2.50. Orders in New York State should be sent to HOME AND COUNTRY, 93 Malden Lane, New York; outside of New York State to GEO. F. LASHER, 1213 Filbert Street, Philadelphia, Pa. Agents wanted.

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CALENDAR OF SOCIETIES.

Chemical Society, Washington.

Dec. 10.—H. W. Wiley and W. H. Krug, On so called Floridite; T. M. Chatard, Notes on Analysis of Phosphate Rocks; I. T. Davis, Meat Preservatives; W. F. Hillebrand and Wm. H. Melville, On the Isomorphism and Composition of Thorium and Uranous Sulphates; a paper on Midzu Ame is proposed for the meeting of Jan. 14, 1892.

Biological Society, Washington.

Geo. Marx, On the Structure and Construction of the Geometric Spider Web; Chas. D. White, Some Peculiar Forms in an Upland Carboniferous Flora; F. H. Knowlton, Fruiting Ferns from the Laramie Group; Frederick V. Coville, Review of Kuntze's *Revisio Generum Plantarum*; C. W. Stiles, Notes on Parasites: *Spiroptera scutata*.

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PHYSICAL MEASUREMENT.

By HAROLD WHITING, Ph.D., formerly instructor, Harvard University. New Edition, 8vo, 1,326 pages, \$3.75. D. C. HEATH & CO., Publishers, Boston.

World's Fair. Mr. Bancroft went south, says *The Publisher's Weekly*, to avoid rather than to seek work. Having many warm friends in that quarter, he had hoped for a brief period of rest after many years of severe labor. But when Gen. Diaz made this request, offering at the same time not only to co-operate with him in every respect, to give him freely his own views on all important subjects, but to enlist the co-operation of the chiefs of departments and Governors of States, he felt that he could not refuse. Gen. Diaz had shown him many favors in times past; furthermore, the subject had peculiar attractions. He had been over the same ground historically, and was interested in its later development. As in all his publications, Mr. Bancroft will utilize the labors of able assistants, who have been at work in various parts of the republic collecting material. Besides these, Mr. George H. Morrison, Secretary of the History Company of San Francisco, will at once join Mr. Bancroft in Mexico, and assist in carrying forward this important undertaking.

— The geographical collection made by the Department of Geography of the Brooklyn Institute during the years 1889 and 1890, and very greatly increased in value and completeness, will be exhibited in the Natural History Building in Central Park, New York, at Fifth Avenue and Sixty-fourth Street, for six weeks, beginning on Dec. 24, at nine o'clock. The exhibition will occupy the two main floors of the building, and will be open free to the public from 9 A.M. to 6 P.M., on six days in the week, and until ten o'clock on Wednesday and Saturday evenings. The exhibition is given at this time in order to afford teachers, superintendents, and all others interested in education from all parts of the country, to visit and study the collection during the holidays, when the schools are not in session. The exhibition is made under the auspices of the New York Teachers' Association, which defrays all the incidental expenses. The Board of Park Commissioners of New York have generously contributed the use of the Museum Building.

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